

(19) World Intellectual Property  
Organization  
International Bureau



(43) International Publication Date  
19 February 2004 (19.02.2004)

PCT

(10) International Publication Number  
**WO 2004/015321 A1**

(51) International Patent Classification<sup>7</sup>: **F16L 13/02,**  
13/14

Marcel, Ghislain [FR/FR]; 29, rue Clauzel, F-75009 Paris  
(FR). HOSS, Jean, Louis [FR/FR]; 3, avenue Rozee,  
F-95110 Sannois (FR).

(21) International Application Number:  
PCT/EP2003/009305

(74) Agent: FITZPATRICKS; 4 West Regent Street, Glasgow  
G2 1RS (GB).

(22) International Filing Date: 1 August 2003 (01.08.2003)

(81) Designated States (*national*): AE, AG, AL, AM, AT, AU,  
AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU,  
CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,  
LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW,  
MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC,  
SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA,  
UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
0217937.2 2 August 2002 (02.08.2002) GB

(71) Applicant (*for all designated States except US*): STOLT  
OFFSHORE S.A. [FR/FR]; 32, avenue Pablo Picasso,  
TSA 76001, F-92754 Nanterre Cedex (FR).

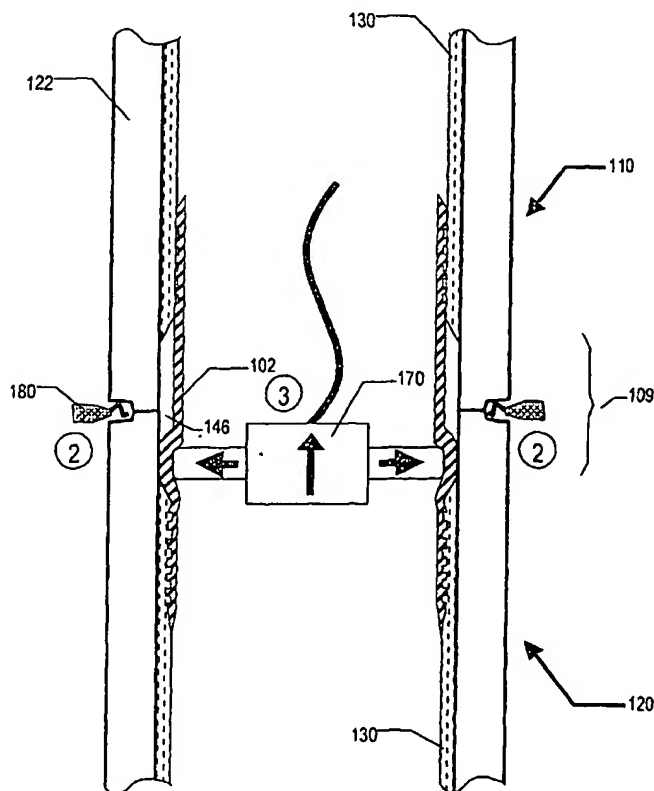
(84) Designated States (*regional*): ARIPO patent (GH, GM,  
KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW),  
Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM),  
European patent (AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO,

(72) Inventors; and

(75) Inventors/Applicants (*for US only*): ALLIOT, Vincent,

[Continued on next page]

(54) Title: METHOD OF AND APPARATUS FOR INTERCONNECTING LINED PIPES



(57) Abstract: There are disclosed methods of and apparatus for interconnecting lined metal pipes (110, 120), applying in particular to the offshore oil and gas industry. Corrosion is a common problem in the industry. Lining pipes overcomes the problem, but welding sections of pipe together can be a complicated and time-consuming task, requiring dedicated and sophisticated tooling. More desirable is the ability to use conventional pipe-laying equipment (20, 40, 50, 60, 70, 80, 90) with little additional tooling. As such, there are disclosed methods and apparatus compatible with known offshore connection methods, particularly where the spacing of joints on the pipe is less than 100m. The chosen technique will not significantly impact the laying rate of the lined pipe, compared with unlined pipe. The method includes connecting lined pipes (110, 120) using a corrosion-resistant bridging member (102) internally overlapping both linings, leaving a void space (146) behind the weld region (109) while at least the initial stages of welding (180) are performed, and expanding (170) the bridging member to provide a seal against the liners, in a controlled sequence. There is also disclosed a bridging member (102), tooling (170) and pipelay apparatus suitable for use with this method.



SE, SI, SK, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Published:**

- *with international search report*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/EP 03/09305

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 F16L13/02 F16L13/14

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 F16L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category * | Citation of document, with indication, where appropriate, of the relevant passages                                    | Relevant to claim No.                              |
|------------|---|--|
| X          | US 6 226 855 B1 (MAINE LESLIE)<br>8 May 2001 (2001-05-08)<br><br>column 2, line 61 -column 3, line 33;<br>figures 2,3 | 1,4-6,<br>9-12,17,<br>19-24,<br>27,31,<br>34,35,37 |
| Y          | ---   | 13-16  |
| X          | US 5 566 984 A (ABBEMA WILLIAM D ET AL)<br>22 October 1996 (1996-10-22)<br><br>page 12, paragraph 2; claim 16         | 1,4,6,<br>9-12,17,<br>19-21,<br>31,34-37           |
| Y          | US 6 213 686 B1 (BAUGH BENTON F)<br>10 April 2001 (2001-04-10)<br>the whole document                                  | 13-16  |
|            | ---   |  |
|            | -/-   |  |

☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

### \* Special categories of cited documents:

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

- \*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- \*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- \*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- \*G\* document member of the same patent family

Date of the actual completion of the international search

3 December 2003

Date of mailing of the international search report

16/12/2003

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
Fax: (+31-70) 340-3018

Authorized officer

Dauvergne, B

# INTERNATIONAL SEARCH REPORT

International Application No.  
PCT/EP 03/09305

| C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT |   |                       |
|--|---|-----------------------|
| Category *   | Citation of document, with indication, where appropriate, of the relevant passages                | Relevant to claim No. |
| A  | DE 88 13 893 U (GEA CANZLER GMBH)<br>19 January 1989 (1989-01-19)<br>page 4, paragraph 3<br>----- | 1                     |

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No.

PCT/EP 03/09305

| Patent document<br>cited in search report |    | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|---|----|---------------------|----------------------------|---------------------|
| US 6226855                                | B1 | 08-05-2001          | GB 2319315 A               | 20-05-1998          |
|   |    |                     | AU 722908 B2               | 17-08-2000          |
|   |    |                     | AU 4790997 A               | 03-06-1998          |
|   |    |                     | BR 9707276 A               | 13-04-1999          |
|   |    |                     | CA 2241948 A1              | 22-05-1998          |
|   |    |                     | CZ 9802094 A3              | 17-03-1999          |
|   |    |                     | DE 69716031 D1             | 07-11-2002          |
|   |    |                     | DE 69716031 T2             | 14-08-2003          |
|   |    |                     | EP 0871832 A1              | 21-10-1998          |
|   |    |                     | ES 2184998 T3              | 16-04-2003          |
|   |    |                     | WO 9821513 A1              | 22-05-1998          |
|   |    |                     | HU 9902192 A2              | 29-11-1999          |
|   |    |                     | JP 11502012 T              | 16-02-1999          |
|   |    |                     | JP 3179505 B2              | 25-06-2001          |
|   |    |                     | NO 983143 A                | 08-07-1998          |
|   |    |                     | PL 328961 A1               | 01-03-1999          |
|   |    |                     | RU 2155290 C2              | 27-08-2000          |
|   |    |                     | SK 91698 A3                | 11-02-1999          |
| US 5566984                                | A  | 22-10-1996          | US 5547228 A               | 20-08-1996          |
|   |    |                     | AU 2193195 A               | 23-10-1995          |
|   |    |                     | WO 9527166 A1              | 12-10-1995          |
| US 6213686                                | B1 | 10-04-2001          | US 6364573 B1              | 02-04-2002          |
|   |    |                     | US 6334739 B1              | 01-01-2002          |
|   |    |                     | US 6293732 B1              | 25-09-2001          |
|   |    |                     | US 6273643 B1              | 14-08-2001          |
|   |    |                     | US 2001033773 A1           | 25-10-2001          |
| DE 8813893                                | U  | 19-01-1989          | DE 8813893 U1              | 19-01-1989          |